Management of Retinal Complications of Cataract Extraction

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Financial Disclosures

- Genentech: Phase 3 Supported research
- Ophthotech: Phase 3 Supported research
- TOGA Trial Group: Phase 3 Supported research
- Thrombogenics: Phase 4

- Retina Galley, LLC – Founder and Owner
- Drug Delivery Company, LLC – Founder and Vice-President
- US Retina – Shareholder and Member
Cataract Surgery Complications

- Less than Perfect Vision Immediately
- Expectations are Very High
- Expectations set by:
  - Surgeon
  - Patient (fellow eye)
  - Peer group – friends and family
Vision Loss ~ Pain

• Corneal Edema

• IOL complication (dislocation)

• Media Opacity

• Macular / Retinal / Optic Nerve abnormality
Cataract Surgery Complications

- Retinal Detachment
- Endophthalmitis vs. TASS
- Retained Lens Fragments
- Cystoid Macular Edema
- Dislocated IOL
Stuff Happens

- Uveitis
- Capsule rupture
- Iris to wound
- Corneal edema
- Glaucoma
- Corneal abrasion
- Wound leak
- Hypotony maculopathy
- Strabismus

- Vitreous hemorrhage
- Hyphema
- Choroidal effusion
- Choroidal hemorrhage
- Toxic retinopathy (light, drug)
- ?Wet AMD
- Vitreous to wound
Cataract Surgery Complications

- Retinal Detachment
- Endophthalmitis
- Retained Lens Fragments
- Cystoid Macular Edema
- Dislocated IOL
Pseudophakic Retinal Detachment

Incidence

- 0.62% to 8.1% of cases
- 7 year follow-up study showed risk increase from 2% to 8% from year 4 to 7.
Pseudophakic Retinal Detachment

Association or Cause

Whenever I wash my car, it rains!
Pseudophakic Retinal Detachment

Cause – Mechanism:

• surgical manipulation of the operated eye
• changes in the vitreous humor that lead to posterior vitreous detachment and subsequent PRD
• Both
Pseudophakic Retinal Detachment

Pseudophakic Retinal Detachment

- 9-fold increase in PRDs relative to the fellow eye in the first 6 months
  - surgical procedure
    - vitreous traction
    - anterior movement
- 3-fold increase in PRDs relative to the fellow eye in the next 10 years
  - changes in the vitreous
  - PVD?
Risk factors

- Age
- High myopia (axial length > 23 mm)
- Vitreous loss during cataract surgery (3-10 times higher risk)
- Male sex
- History of retinal tear or RD in fellow eye
- Family history of RD
Pseudophakic Retinal Detachment

Risk of Pseudophakic Retinal Detachment in 202,226 Patients Using the Fellow Nonoperated Eye as Reference
Søren S. Bjerrum, Kim L. Mikkelsen, Morten La Cour
Ophthalmology 1 December 2013;120:2573-2579
Pseudophakic Retinal Detachment

Clinical Features

- Painless progressive decreased vision or visual field defect
- Flashes & floaters
- Low Intra-ocular pressure
- Hyperopic shift, vitreous hemorrhage, pigment in vitreous, CME
Types of Pseudophakic Retinal Detachment
Treatment options

- Observation
- Laser
- Pneumatic retinopexy
- Scleral Buckle
- Vitrectomy
- Vitrectomy & Scleral Buckle
How often do you perform pneumatic retinopexy?

Never
US 9.5% Intl 30.8%

< once per month
US 49.6% Intl 52.1%

1-3 times per month
US 33.1% Intl 12.5%

4-12 times per month
US 7.5% Intl 3.8%

> 12 times per month
US 0.2% Intl 0.8%

51. How often do you perform pneumatic retinopexy?  n = 744
Primary Rhegmatogenous RD

Vitrectomy

Scleral Buckle
Rationale for using pars plana vitrectomy (PPV) for primary RRD

- PPV eliminates vitreoretinal traction
- PPV allows complete retinal reattachment at conclusion of procedure by using air or gas
- PPV avoids complications associated with scleral buckling
Vitrectomy for Primary Management of RD

- Randomized clinical trial:
  - 75 eyes PPV, 75 SB for Pseudophakic RD
  - Single surgery SB 83%, PPV 94% (P=0.037)
  - Final reattachment rate: SB 94%, PPV 99% (P=0.37) *EXCELLENT PROGNOSIS
  - Mean VA outcome similar
  - No breaks found preop: SB 13%, PPV 17%

Vitrectomy for Primary Management of RD

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Events</th>
<th>PPV Total</th>
<th>Events</th>
<th>SB Total</th>
<th>Weight</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S.1.1 Primary reattachment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Ahmadieh 2005</td>
<td>62</td>
<td>99</td>
<td>86</td>
<td>126</td>
<td>26.4%</td>
<td>0.78 [0.45, 1.36]</td>
</tr>
<tr>
<td>Brazitikos 2005</td>
<td>71</td>
<td>75</td>
<td>62</td>
<td>75</td>
<td>15.2%</td>
<td>3.72 [1.15, 12.01]</td>
</tr>
<tr>
<td>Heimann 2007</td>
<td>95</td>
<td>132</td>
<td>71</td>
<td>133</td>
<td>27.3%</td>
<td>2.24 [1.35, 3.73]</td>
</tr>
<tr>
<td>Moradian 2009 (SB vs PPV)</td>
<td>30</td>
<td>42</td>
<td>36</td>
<td>48</td>
<td>18.9%</td>
<td>0.83 [0.33, 2.12]</td>
</tr>
<tr>
<td>Sharma 2005</td>
<td>21</td>
<td>25</td>
<td>19</td>
<td>25</td>
<td>12.2%</td>
<td>1.66 [0.41, 6.78]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>279</td>
<td>373</td>
<td>407</td>
<td>100.0%</td>
<td>1.46</td>
<td>[0.79, 2.71]</td>
</tr>
<tr>
<td><strong>Total events</strong></td>
<td>279</td>
<td>373</td>
<td>407</td>
<td>100.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.30; Chi² = 11.49, df = 4 (P = 0.02); I² = 65%

Test for overall effect: Z = 1.21 (P = 0.23)

| **S.1.2 Secondary reattachment** |        |           |        |          |        |                                |
| Ahmadieh 2005                    | 92     | 99        | 107    | 126      | 52.5%  | 2.33 [0.94, 5.80]              |
| Brazitikos 2005                  | 74     | 75        | 71     | 75       | 8.9%   | 4.17 [0.45, 38.21]             |
| Heimann 2007                     | 126    | 132       | 124    | 133      | 38.6%  | 1.52 [0.53, 4.41]              |
| Sharma 2005                      | 25     | 25        | 25     | 25       | Not estimable                  |
| **Subtotal (95% CI)**            | 317    | 331       | 359    | 100.0%   | 2.08   | [1.08, 4.03]                   |
| **Total events**                 | 317    | 331       | 359    | 100.0%   |        |                                |

Heterogeneity: Tau² = 0.00; Chi² = 0.77, df = 2 (P = 0.68); I² = 0%

Test for overall effect: Z = 2.18 (P = 0.03)

Surgical Management of Rhegmatogenous Retinal Detachment: A Meta-Analysis of Randomized Controlled Trials Chetan Soni, Dean P. Hainsworth, Arghavan Almony Ophthalmology 2013:120;Pages 1440-1447
PPV with PFCL

Bullous Retinal Detachment
PPV with PFCL

Giant Retinal Tear
What percentage of the time do you use PFCL in vitrectomy for routine primary RRD without PVR?

United States
- 8.6% 76%-100%
- 6.4% 51%-75%
- 6.6% 26%-50%
- 35.3% 1%-25%
- 43.1% 0%

International
- 32.9% 76%-100%
- 30.0% 1%-25%
- 13.3% 51%-75%
- 11.3% 26%-50%
- 12.5% 0%

46. What percentage of the time do you use perfluorocarbon liquid in the setting of vitrectomy for routine primary rhegmatogenous retinal detachment without PVR? n = 741
Avoiding Complications Associated with Scleral Buckling

- Refractive error with or without anisometropia
- Motility disturbance
- Extrusion, intrusion, and infection of exoplant
- Postoperative orbital inflammation / discomfort
- Subretinal hemorrhage, retinal incarceration (external drainage)
- Avoid sutures in blue ectatic sclera
Scleral Buckle - Advantage

- Recurrent retinal detachment does better after a primary buckle (Planning for the next surgery)
- Older patients may be unable to position
- Configuration of retinal detachment – inferior pathology
- Retinal Detachments involve The Art of Medicine – Dealing with the Gray Areas
What is your *usual* recommendation for pseudophakic superior RD, macula-on, -3.00 myope, single tear?

- Scleral buckle: US 6.0% Intel 13.4%
- Vitrectomy without buckle: US 10.0% Intel 57.8%
- Vitrectomy with buckle: US 10.0% Intel 56.1%
- Pneumatic retinopexy: US 26.3% Intel 15.1%
- Other: US 0.0% Intel 1.3%

52. For a 65-year-old patient with a pseudophakic RD, -3.00D myope, 1/2 clock-hour size flap tear at 11:00 *anterior* to the equator, 45% detached, macula-on, fellow eye with poor vision, I *usually* recommend:
Cataract Surgery Complications

- Retinal Detachment
- **Endophthalmitis vs. TASS**
- Retained Lens Fragments
- Cystoid Macular Edema
- Dislocated IOL
Endophthalmitis vs. TASS

- Endophthalmitis: Usually not first visit
- *Staphylococcus epidermidis* and *Bacillus cereus* can present within the first 24 h after surgery and failure to recognize and treat this can lead to rapid destruction of the eye.
- Hence the eye should be immediately investigated for infective organisms if there is a TASS-like presentation

Toxic Anterior Segment Syndrome

- Painless and seen on first post-operative visit
- Diffuse limbus to limbus corneal edema
- Fibrin in the anterior chamber (most often with hypopyon)
- Secondary glaucoma
- Irregular or dilated pupil
- Respond to intensive steroid therapy

Toxic Anterior Segment Syndrome

- Introduction of toxins into the eye
  - glove talc
  - surgical instruments
  - drugs

Toxic Anterior Segment Syndrome

Acute Endophthalmitis

- Incidence – 0.10% to 0.01%
- Acute – 1 day - 1 week
- Hypopyon
- Pain
- Vision loss
Acute Endophthalmitis Following Cataract Surgery

A Systematic Review of the Literature

Mehran Taban, MD; Ashley Behrens, MD; Robert L. Newcomb, PhD; Matthew Y. Nobe; Golnaz Saedi, BS; Paula M. Sweet, MT; Peter J. McDonnell, MD

Conclusions: This systematic review indicates that the incidence of endophthalmitis associated with cataract extraction has increased over the last decade. This upward trend in endophthalmitis frequency coincides temporally with the development of sutureless clear corneal incisions.

Arch Ophthalmol. 2005;123:613-620

Figure 6. Trends of endophthalmitis rate. Slope is best-fit line from weighted regression analysis (see "Methods" section). A. Based on each study/publication (weighted per surgery), 1963-1991 slope, −0.0103; 1992-2003 slope, 0.0257. B. Based on each year (weighted per surgery), 1963-1991 slope, −0.0103; 1992-2003 slope, 0.0257.
The Incidence of Endophthalmitis after Cataract Surgery among the U.S. Medicare Population Increased between 1994 and 2001

Conclusions: Analysis of Medicare claims data suggests that the incidence of endophthalmitis after cataract surgery has been increasing, but does not provide an explanation for this occurrence. An increase in the incidence of endophthalmitis after cataract surgery is of concern, because cataract surgery is the most commonly performed operation in the United States, and the number of cataract surgeries performed annually will likely increase substantially over the coming decades due to the aging of the U.S. population. Ophthalmology 2005;112:1388–1394 © 2005 by the American Academy of Ophthalmology.

E.S. West, A. Behrens, P.J. McDonnell, J.M. Tielsch, O.D Schein
Is there a relationship between clear corneal cataract incisions and endophthalmitis?
84 Year Old with Rosacea

- S/p phaco/IOL OD 9/27/05
- POD#1 Va 20/40 PH 20/25+
  - IOP 32 mmHg
- POW#1 Va 20/30 OD
  - IOP 18 mmHg
- POW#2
  - Pt awoke with acute loss of Va at 2AM
  - Va CF 6 ft
  - IOP 13 mmHg
84 Year Old with Rosacea

VA CF

Vitreous Haze